



# Demand Response and Advanced Metering Infrastructure

- Lee Hall, Smart Grid and Demand Response Program Manager, BPA Energy Efficiency
- Beth Anderson, Manager of Technical Services, Orcas Power and Light Cooperative
- Melissa Newcomer, Business Development Representative, Kootenai Electric Cooperative



# Demand Response and Advanced Metering Infrastructure

Presented by:

Lee Hall, Smart Grid and Demand Response Manager  
BPA Energy Efficiency



# Background – What is Driving Activity?

- Peak demand is expected to continue to grow at an average rate of 1.7% annually.
- Load growth, wind integration and fish operations are testing the capacity of the Federal Columbia River Power System.
- The costs of building and permitting new resources is increasing.
- Legislation, including I-937, renewable portfolio standards, and cap-and-trade are limiting the types of new resources that utilities can acquire.
- The Northwest Power and Conservation Council's Sixth Power Plan calls for research of Demand Response (DR) through **pilot projects** and **technology demonstrations**

**“...achievable technical potential for demand response in the region is around 5% of peak load over the 20-year plan horizon. The plan assumes 1,500 to 1,700 megawatts of load reductions in the winter and summer, respectively....”**

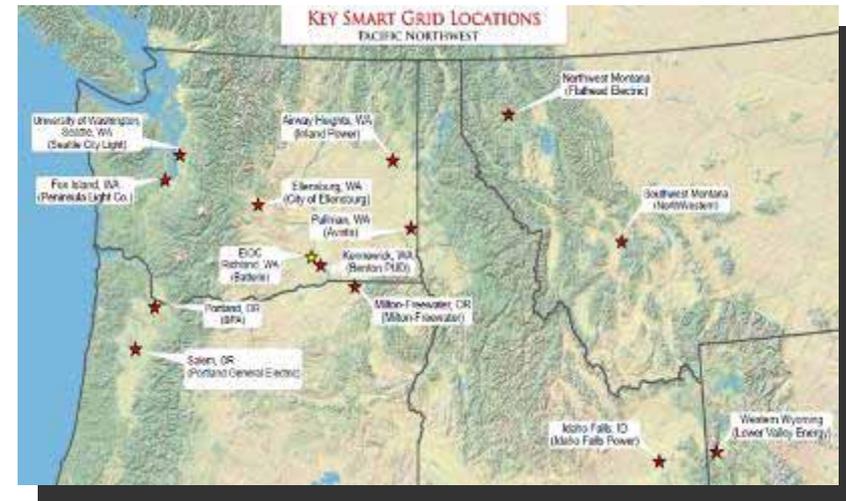
Sixth Northwest Power Plan, Chapter 5



# Smart Grid and Demand Response

## ■ Pacific Northwest Smart Grid Demonstration Project

- \$178 million five-year project led by Battelle Memorial Institute
- Largest DOE demonstration award in nation
- Project participants includes:
  - BPA
  - 12 utilities
  - 5 project-level vendors
- 60,000 metered customers
- **10 utility Demand Response tests**



## ■ Widespread AMI and DR Efforts in the PNW

- E.g. Idaho Power, PacifiCorp, Portland General Electric, Snohomish PUD, Central Lincoln...

## ■ BPA Demand Response Program



# BPA Demand Response Goals

The theme of BPA's Demand Response program in 2010 and 2011 is to encourage Demand Response learning in the Pacific Northwest, with a view to support the creation of a longer term resource

**Goal 1 – Conduct Pilots.** Be a catalyst for innovation by developing a broader base of NW learning and utility familiarity with Demand Response by running pilots.

- Advance testing and adoption of **DR technologies**
- Support **market penetration** in the Pacific Northwest
- Learn from **end-customer engagement**: customer recruitment strategies, education and program participation persistence

**Goal 2 – Evaluate Pilots & Conduct Research.** Design and collect data with a view to building a repository of sharable learning through region. Evaluate cost effectiveness.

**Goal 3 – Outreach and Awareness.** Execute communication plan that furthers internal and external awareness of the value and learnings around Demand Response.

**Goal 4 – Develop Long Term Strategy and Help Coordinate Policy in the Region.** Support the creation of a long-term roadmap to build this resource within the region, develop BPA's role as a hub of expertise, and collaborate with region on policy.

# BPA Demand Response Program 2010 -2011

## ■ Residential Pilots

- In Progress: Kootenai Electric  
Central Electric



- Funding Opportunity Announcement released for additional pilots (\$1,500,000)
  - Released: 2/18/2010
  - Letter of intent to respond: 3/19/2010
  - Responses due: 4/19/2010

## ■ Commercial & Industrial Pilots

- Initiating additional open ADR pilot(s) in Mid-2010
- Selecting vendor partner to support program
- Results available from SCL building pilot (Case studies to be released by early April)

## ■ Demand Response Knowledge Sharing

- Kicking off program to share advance DR learning in PNW. Mid-2010
- Collaboration with Pacific Northwest Demand Response Project

## ■ Evaluating programs for long-term implementation

# Contact

## For more information, contact:

Lee Hall

Smart Grid and Demand Response Program Manager

[ljhall@bpa.gov](mailto:ljhall@bpa.gov)

503-230-5189

## Additional resources:

- Northwest Power and Conservation Council's Sixth Power Plan (Demand Response – Chapter 5) <http://www.nwcouncil.org/energy/powerplan/6/default.htm>
- BPA Residential Pilot Funding Opportunity Announcement [http://www.bpa.gov/Energy/N/demand\\_ann.cfm](http://www.bpa.gov/Energy/N/demand_ann.cfm)
- Smart Grid - PNW Smart Grid Demonstration Project [http://www.bpa.gov/Energy/N/smart\\_grid/index.cfm](http://www.bpa.gov/Energy/N/smart_grid/index.cfm)
- Case Study for the Open ADR pilot with Seattle City Light <will be posted by early April> <http://www.bpa.gov/Energy/N/demand.cfm>



# Load Management & Beyond

Presented by:

Beth Anderson ~ Manager, Island Network/Tech Services  
Orcas Power & Light Cooperative







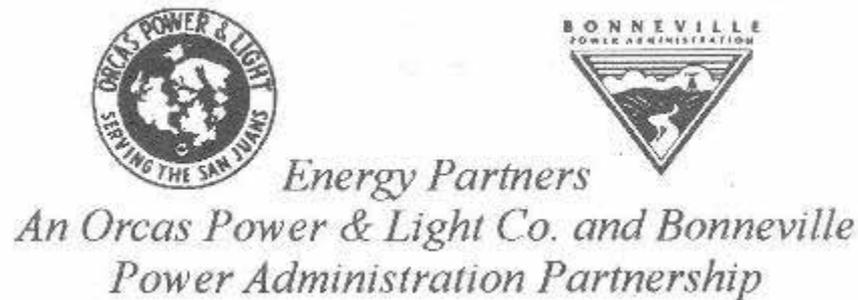


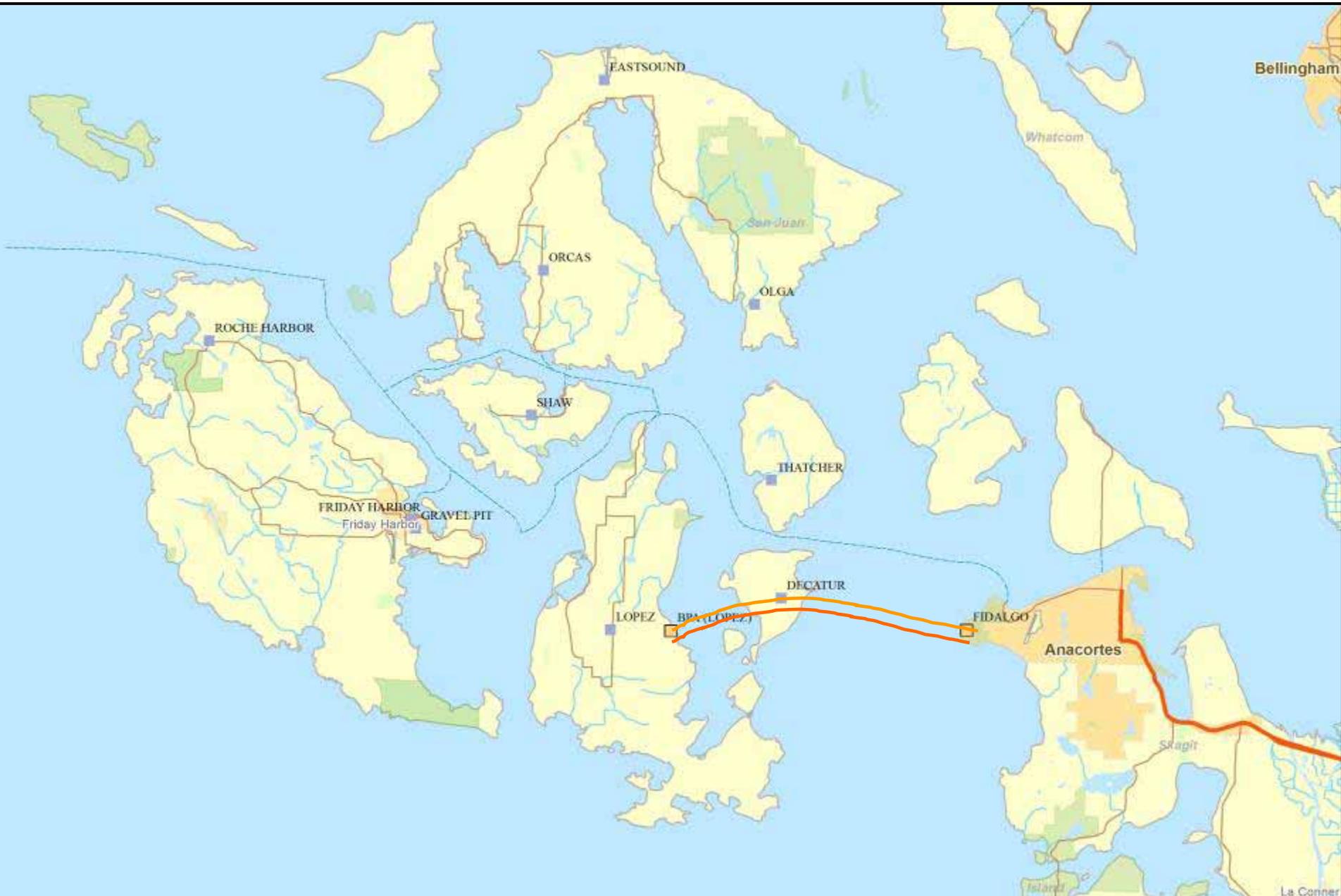
# Overview

- Load Management History
- TWACS Automatic Meter Reading (AMR)
- TWACS Demand Response (DR)
- Home Area Network (HAN) Pilot Project
- Future Plans

# History - Load Management

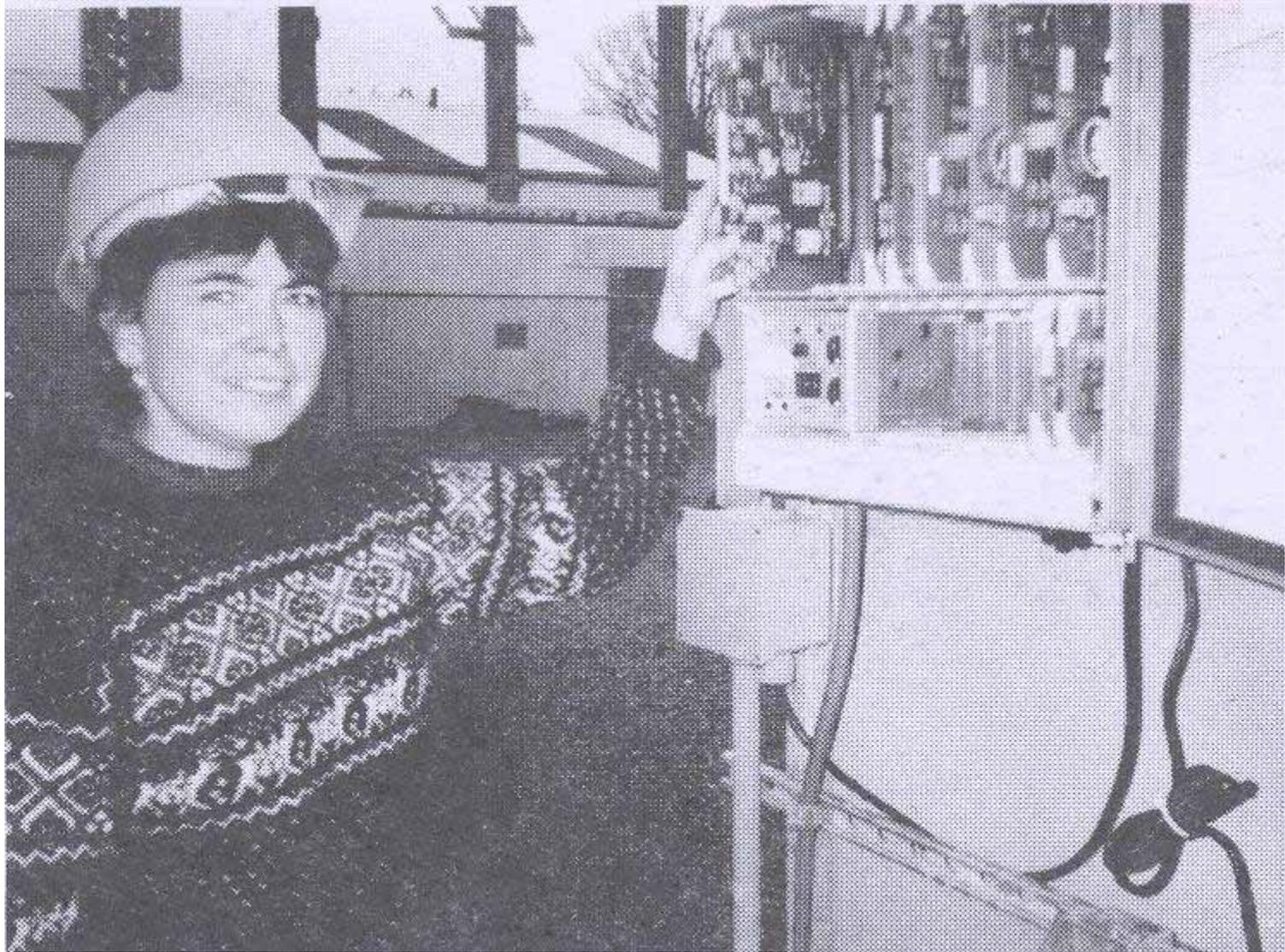
- 1996 OPALCO/BPA Partnership – *Energy Partners*
- Reason ~ Peak Demand Control
- Targets:
  - Load Control Devices (LMR)
  - Conservation Reduction Measures





# Cannon LMR





# Load Management - Lessons Learned

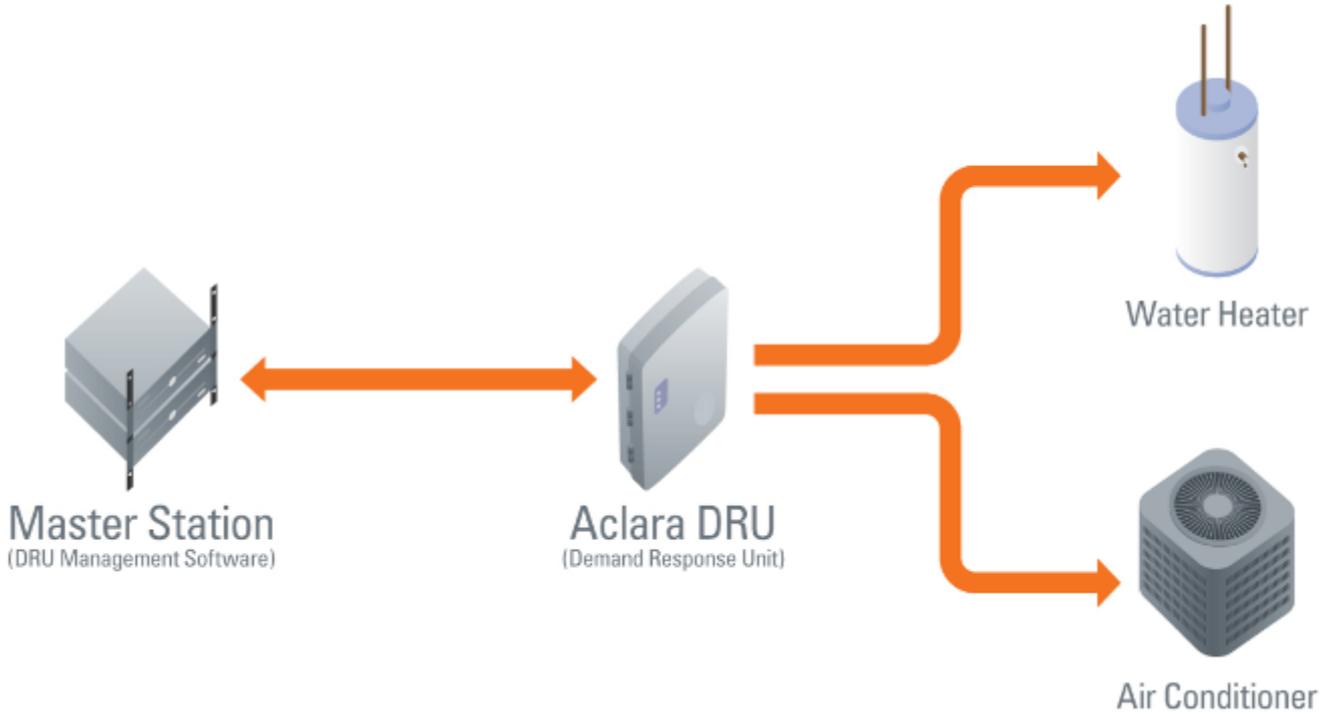
- Target Specific Areas
- Know your State Electrical Rules for Inspections
- Select a Power Line Carrier Vendor with proven track record for Signal Propagation
- Prepare for program administration
- **Important** – Document all devices & locations
- Perform biennial inspections of devices
- Acknowledge that utility takes ownership of water heater circuit once installed

# Fast Forward

- 2005 - Staff began a Comparative Analysis on AMR PLC Technologies; Selected ACLARA - TWACS
- 2007 – Installation of Aclara Power Line Carrier
- Features of TWACS
  - Two-way communication to all devices
  - No signal propagation problems
  - Meters read within seconds
  - Voltages can be checked at end of feeder
  - Solid platform for future applications
  - Demand Response solution

# ACLARA Demand Response

- When energy demand is high, the Aclara DRU reduces peak-power costs without impacting customer service.



# Aclara Demand Response Unit (DRU)

- Supports Direct Load Control Programs
- Can Protect end devices
- Improves Grid Reliability (Smart Grid)
- Minimizes end customer impact
- Controls Two Devices
- Provides Two-Way Communication and feedback

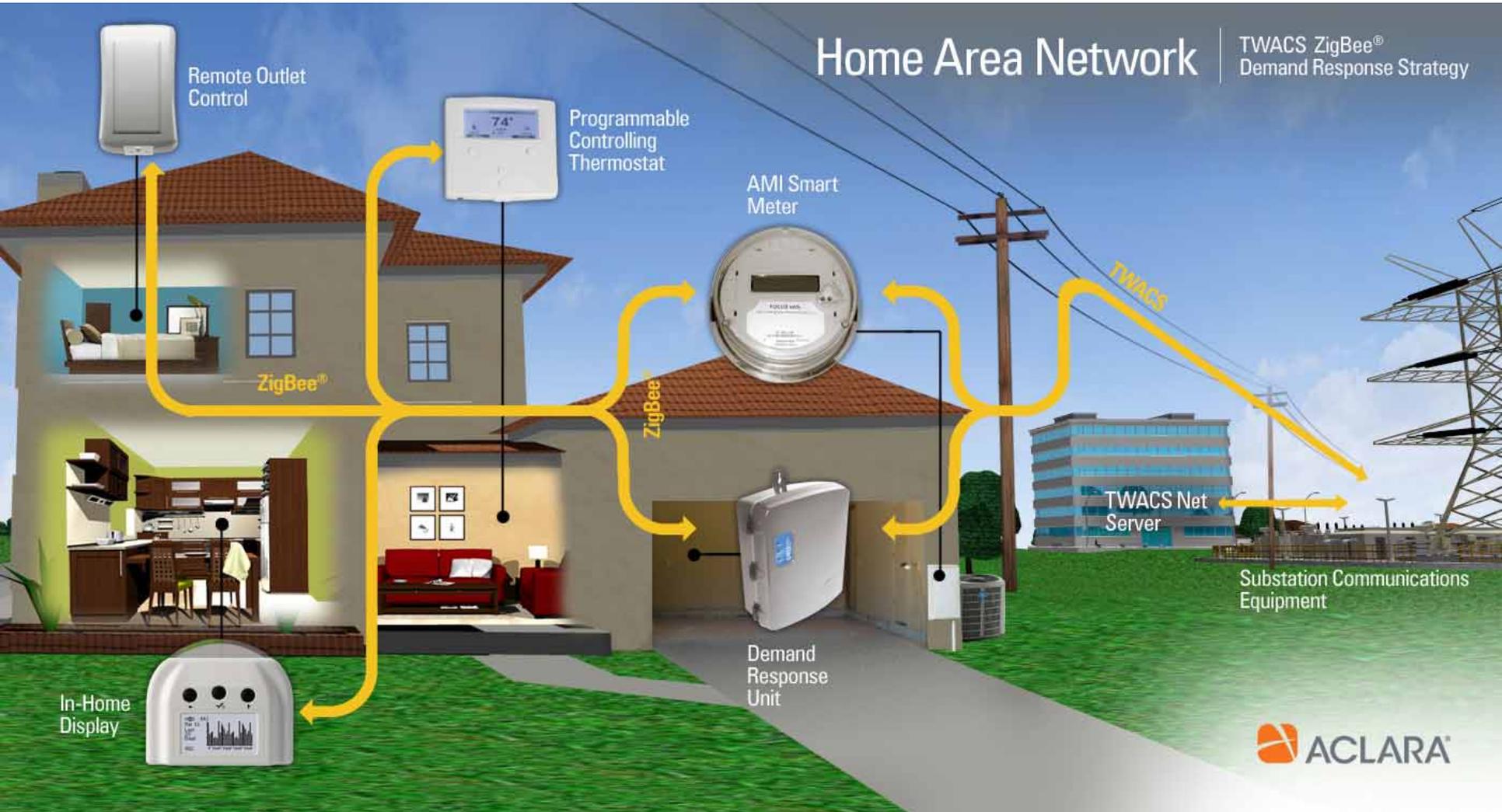


# OPALCO/ACLARA HAN Pilot

- April 2010 – OPALCO & Aclara will deploy a Home Area Network (HAN) pilot project

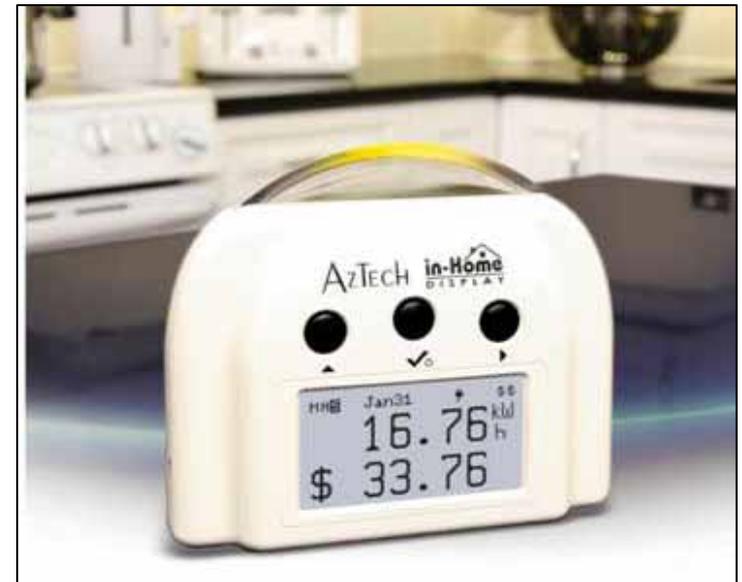


# TWACS® HAN Overview



# ZigBee In-Home Displays (IHD)

- Provide Consumers with information to make more informed decisions
- Tracks real-time energy usage
  - Demand (kW and \$/hr)
  - Current meter reading (kWh)
- Displays pricing information
  - Supports flat rates, TOU
  - Tracks kWh and \$ by TOU tier
- Provide a mechanism for general broadcast text messaging



# ZigBee Smart Thermostats – Key Features



- Programmable Thermostat
  - Benefits customer independent of DR events by providing a tool for cutting energy costs
- Allows remote temperature setbacks
- Provides event status display
- Supports basic text messaging
- Allows both mandatory and voluntary events to allow customer overrides
- Can react to Pricing Alerts (TOU)

# Aclara Home Area Networking Solutions – Current Status

- Pilot Deployments started in January 2010 for Smart Thermostats
- Will start deploying In-Home Displays in Mid-March
- Pilot solution is meter-based -> Utilizing L+G Focus AX Meter



# Future Plans

- Data mining of AMI readings
- Web interface for members to:
  - Check Usage
  - Turn on/off appliances
  - Manage their own loads
- Water meter reading – paid service to other utilities
- Pre-pay Metering/Billing
- HAN Project Full Deployment

# Questions?

# Thank You!

# Contact

For more information, contact:

Beth Anderson  
Manager, Island Network & Technical Services  
banderson@opalco.com  
360-376-3528



# Demand Response Load Control

Presented by:

Melissa Newcomer, Business Development Representative  
Kootenai Electric Cooperative, Inc.



# The KEC Aclara® TWACS® AMI System.

- Began installing the system in 2001
- System installation complete in 2003
- Reduced the response time to a power outage
- Bills more accurate
  - Old system: usage billed 30 to 60 days later
  - New system: current usage billed
  - Caused a high bill the first month implemented

# The BPA/KEC Load Control Pilot

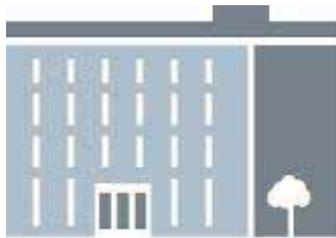
- Developing the pilot began in early 2009
  - Approval from Board of Directors
  - Defining scope of work
  - Contracting electricians
  - Designing the program to work with current staff
  - Delivery of products
- Installations began in January 2010
- The objective is to control residential water heaters and thermostats via our AMI system

# Pilot Description

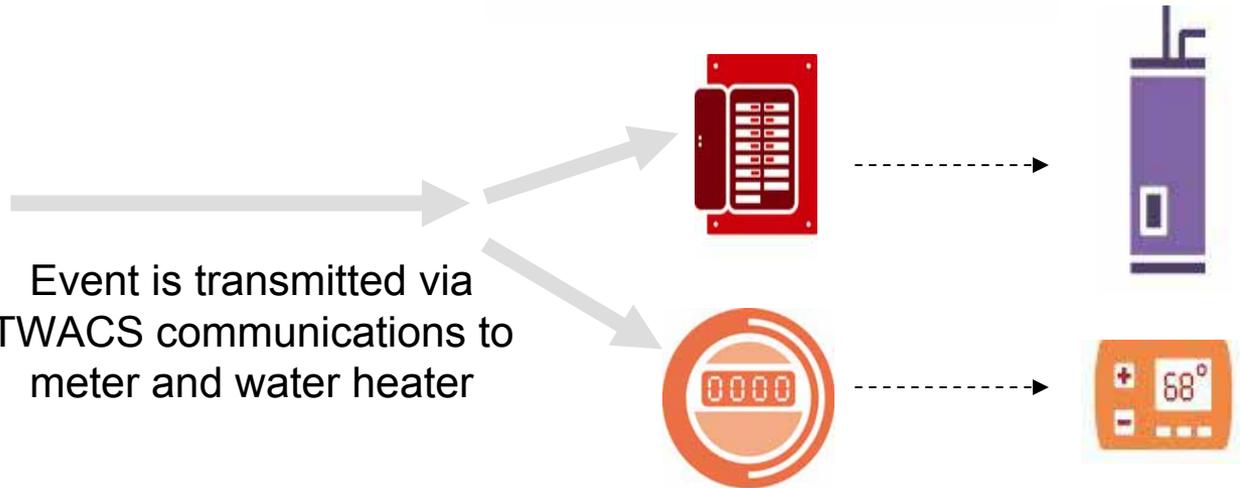
- The goal is to install load control equipment in 400 to 500 residential homes by October 2011
- Water heaters and thermostats will be controlled
- The pilot will cover two years and involves 8 load control “events”
- Data loggers will be installed in 60 homes
  - None currently installed

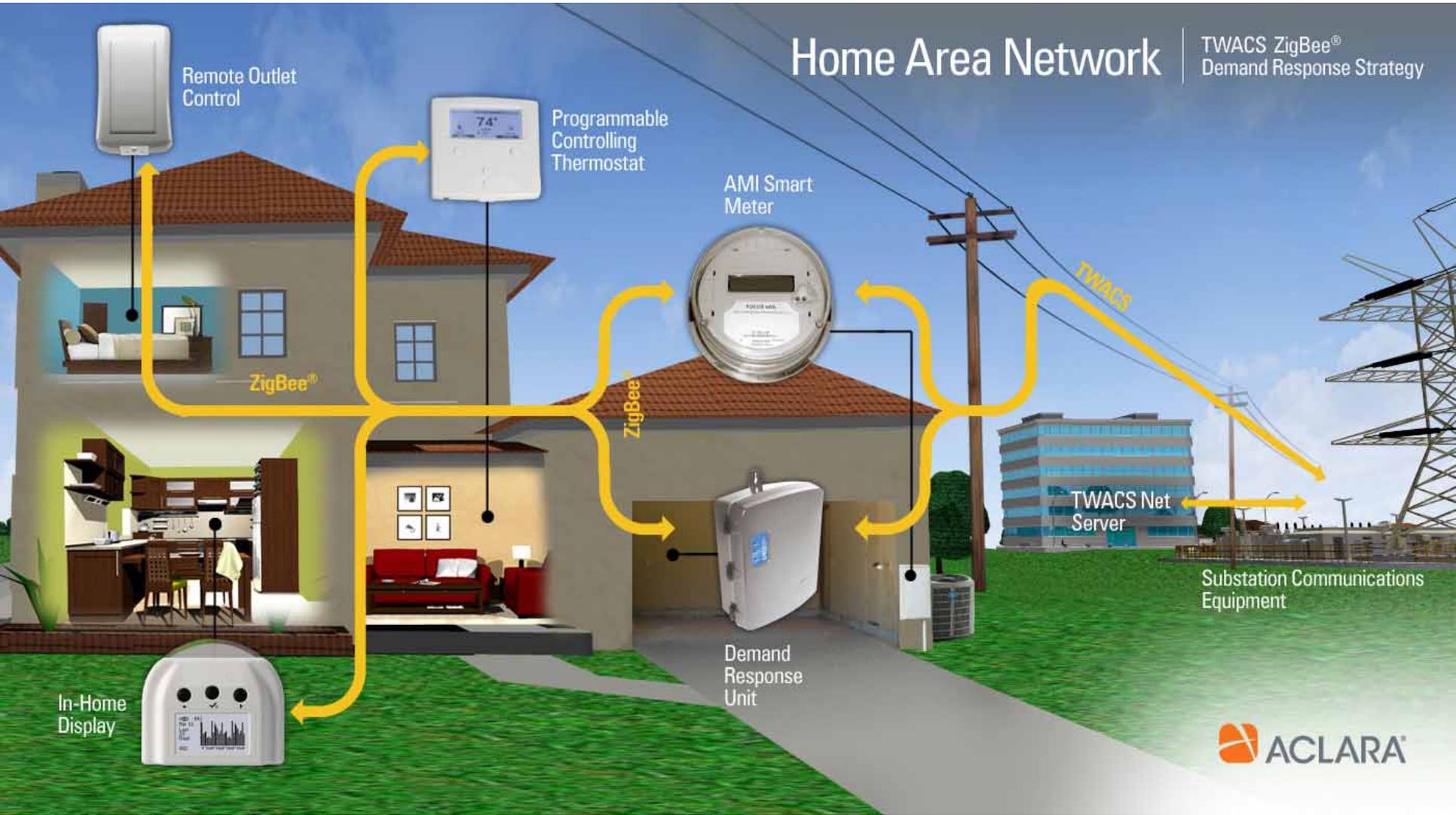
# How it Works

**Kootenai Electric issues a demand response event**



Event is transmitted via TWACS communications to meter and water heater





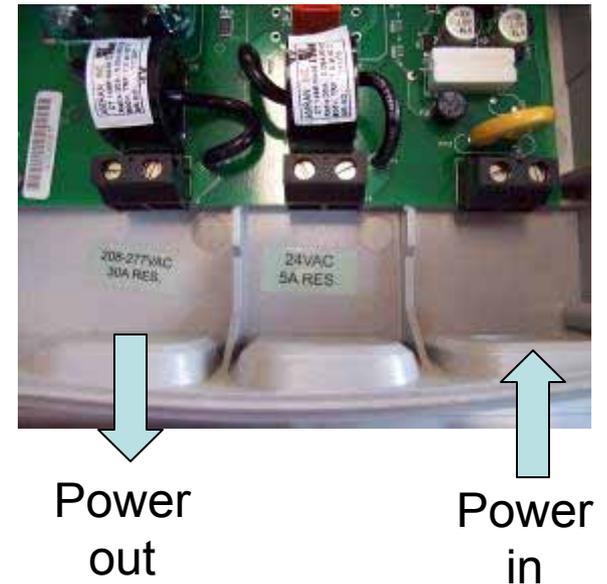
# Aclara® Demand Response Unit (DRU)

- Provides direct load control
  - From KEC to DRU
- Two-way communication
- Provides a simple approach to control water heaters
  - Simply interrupting the power



# How the DRU Works

- Power runs:
  - To the DRU
  - From DRU to water heater
- Three indicator lights
  - Power to water heater
  - Faulty DRU
  - Load control event



# Energate Smart Thermostat

- Programmable Thermostat
  - A benefit to the member
- Setback temperature remotely
- Allows basic text messaging
- Both mandatory and voluntary events
- Can display time of use rates
  - Not currently used at KEC

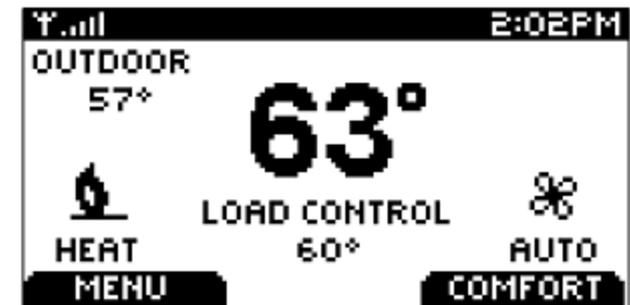


# How the Thermostat Works

- Utility Message allows for 50 characters in text message
- Home screen reads “load control” during event
- Blue LED light appears on thermostat during event



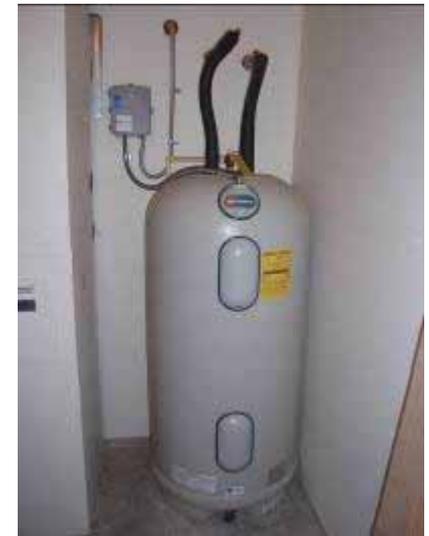
Utility Text Message



# The Installation Process

- Change out meter
- Replace Thermostat
  - Program to equipment type and user preferences
- Install DRU(s)
- Check connection
  - Call KEC to search in the meter
  - Send text message “Welcome to the Peak Project”

# Installation Pictures



# Scheduling an Event

- KEC is notified the day before the event
- Communication to participants – 12hrs advance
  - Text message via thermostat
  - Automated phone message
  - E-mail notification
- KEC programs the event to occur
  - Send thermostat command in advance
  - Send DRU command in real time
- Download data and send to BPA

**Home Area Network Manager**

Send Command To:

Serial Number

Application ID  Substation:

Price Message | **Text Message** | Temp. Setback | Logs

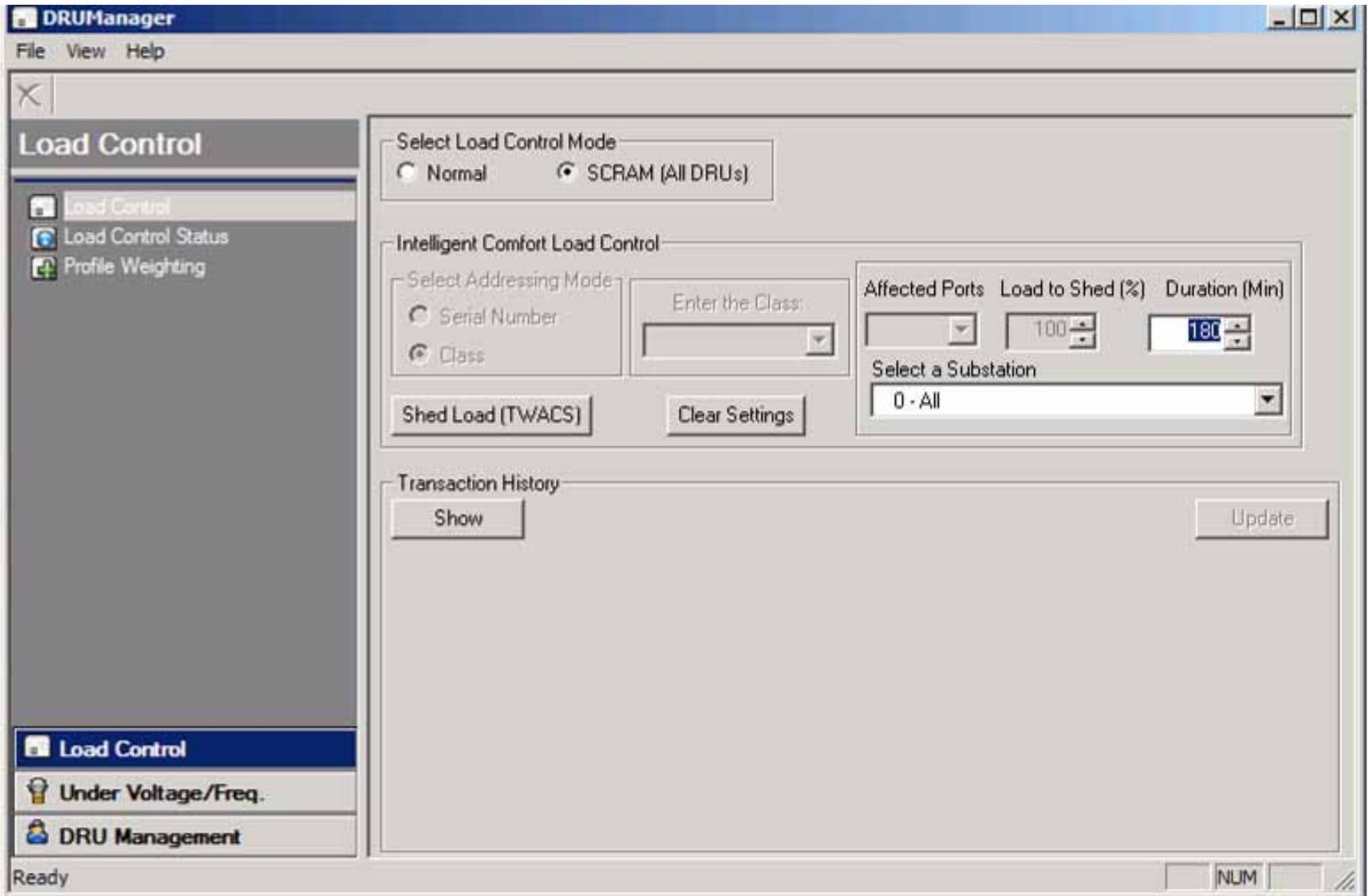
Heating Temp. Change (-):  °F      Cooling Temp. Change (+):  °F

Effective Date:  Effective Time:

Duration:  Min.

Opt Out Allowed

The screenshot shows a software window titled "Home Area Network Manager". At the top, there is a "Send Command To:" section with two radio buttons: "Serial Number" (unselected) and "Application ID" (selected). The "Application ID" dropdown is set to "AMR (AMR)", and the "Substation:" dropdown is set to "-All-". Below this is a tabbed interface with "Text Message" selected. The "Message:" text box contains "Load Control Event Wed March 10th From 7am - 10am". To the right of the message box is an "Expiration" section with "Never" (unselected) and "660 Min." (selected). Below the message box is a "Confirmation Requested" checkbox which is checked. At the bottom of the message box is an "Importance" section with radio buttons for "Low", "Medium", "High", and "Critical" (selected). A "Cancel Last Text Message" button is located below the importance section. At the very bottom of the window are "Send" and "Close" buttons.



# Be Ready for Anything

- Meter
  - Locking ring
- Thermostat
  - Wiring issues (auxiliary switch)
  - Is it compatible?
- DRU
  - Only one hot water heater?



# Program Challenges

- Getting 400 homes to participate
- Explaining benefits to member
  - They want immediate savings on their bill
  - Do not want to sign participation agreement
  - Worried we can control too much
- Variety of HVAC systems
  - Multiple heat pumps, zonal systems
- Variety of thermostats, no wiring standard
- Thermostat preferences of member
  - They like the touch screen thermostats

# Tracking Information

- Program created by our IT department to track member information
- Map was created by our GIS department to show locations of current participants and those interested

### Peak Program

**Name**   
**Street**   
**City**   
**Phone**

**Contact By:**

Phone   
If different phone   
Email   
Mail   
Welcome Packet

**Heard About**

Newsletter  
 Postcard  
 Letter  
 Website  
Other:  
  
 Interested in participating

**Qualifications**

Current Participant  
 Renter  
 Has owner permission  
 Uses Supplemental Heat  
 Disqualified because:

**Contacted KEK**

**Contacted KEK by:**

Phone  
 Mail  
 Website  
 Email  
 In Person  
 Other:

**Notes:**

**fUpdateMain : Form**

**Member**

Name

Street

City

Phone

Account

SUB **Dower**

**Heard About**

Newsletter

Postcard

Letter

Website

Other:

Interested in participating

**Contact By**

Contact Phone

if different phone

Email

Mail

Welcome Packet

**Update** **Cancel**

**Contacted KEK**

Contacted KEK by:

Phone

Mail

Website

Email

In Person

Other:

**Energy Audit Info**

Account

No. of Residents

Square Footage

Year Built

Heat Type

Air Conditioning

Occupied During:

Morning

Mid-day

Evening

Heat Stat Pref

Cool Stat Pref

Water Heater Size

Date WH Installed

HW R-Value

Hot Water Temp

R-Values

Walls

Floor

Ceiling

Winter Stat Setback

Summer Stat Setback

Audit Scheduled

Audit Complete

Install Scheduled:

Install Completed

**Additional Info**

Current Participant

No.

Renter

Has owner permission

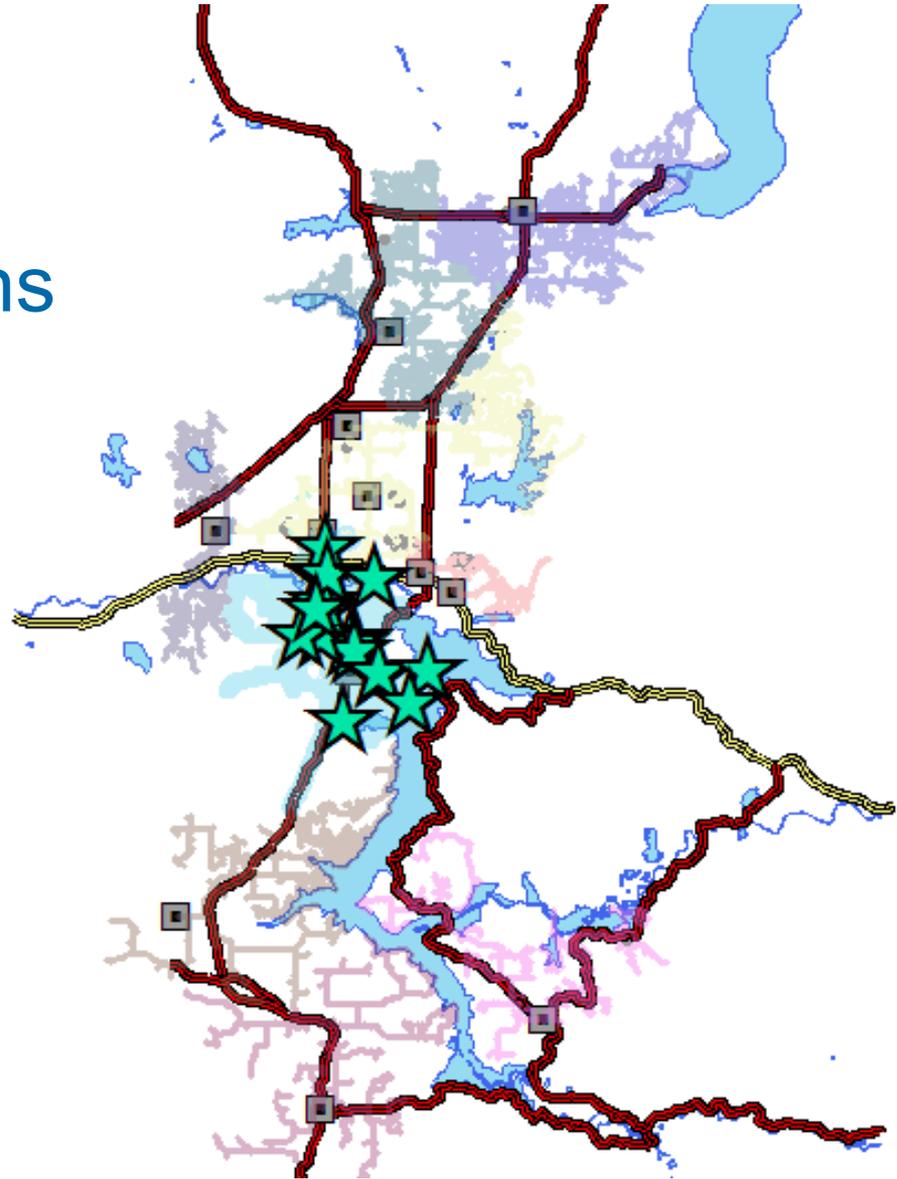
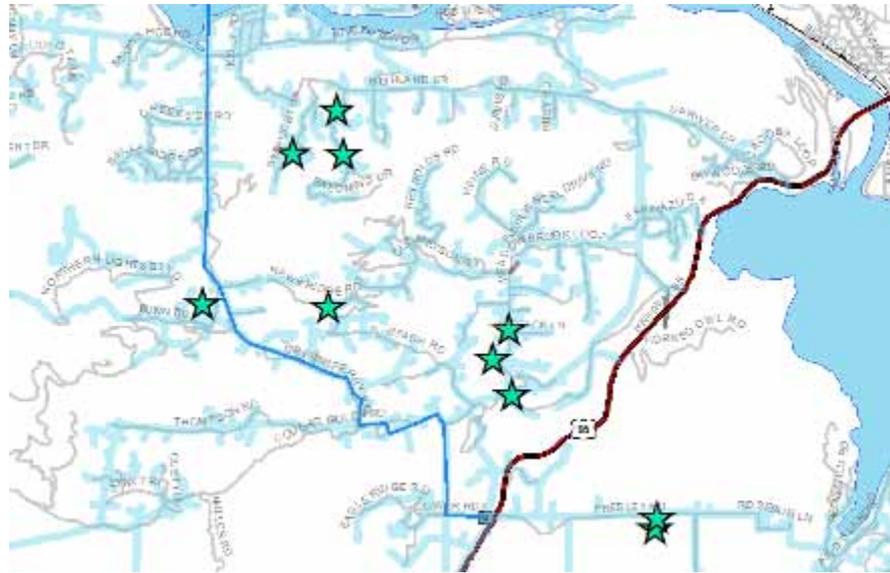
Uses Supplemental Heat

Disqualified because:

**Notes**

Homeowner  
Heat pump w/ground loop  
Out of town till 2/4/10

# Current participant locations



# Marketing the Program

- Marketing content written by ID Branding; approved by BPA and KEC
  - Direct mailing to targeted members
    - Post card and letter
  - Website articles and sign up information
  - Multiple articles in monthly newsletter
  - Bill inserts
  - Promotion at KEC events

THE Peak Project 

# Direct Mailing Post Card



**It's this simple. We'd like you to sign up.**

The Peak Project is a program that reduces energy consumption at times of peak demand. By participating, you help slow the demand for power on our system, and could save money on your energy bill. It's a small sacrifice in each home, but if enough members sign up for Kootenai Electric Cooperative's Peak Project, it will make a huge difference in our electrical demand.

**Sign up**

Call 208.765.1200 or Visit [www.kec.com/peakproject.php](http://www.kec.com/peakproject.php)

**Here's how it works:**

- 1  On some days of peak power usage by Kootenai Electric members...
- 2  We turn off your water heater for a few hours, and adjust your thermostat by a few degrees. You probably won't even notice.
- 3  Multiplied across hundreds of homes this reduces stress on the electrical system and helps ensure a reliable power grid.



# Website

The screenshot shows the Kootenai Electric website's 'Peak Project Form' page. The header includes the Kootenai Electric logo and navigation links: Home, Bill Pay / Account, Contact Us, Site Map, and a search bar. A left sidebar contains a menu with links to About KEC, Account Information, News/Community, Energy Efficiency, Products, Safety, Resources, and Careers. Below the menu are promotional banners for 'Go to KIDS ZONE!', 'Open Connections Card', 'Click Here for DISCOUNTS', and 'Our Energy, Our Future A Dialogue With America'. The main content area is titled 'Peak Project Form' and includes an introductory paragraph, a list of eligibility criteria, a detailed description of the program, and a registration form. The form fields include Name, Address, Account Number, Email Address, Telephone Number, a dropdown for 'How did you hear about the Peak Project?' (set to 'Postcard'), a text area for 'Comments', and a 'Submit' button.

**Kootenai Electric COOPERATIVE**  
A Techno Energy Cooperative

Home Bill Pay / Account Contact Us Site Map Search

**Peak Project Form**

Interested in learning more about participating in the Peak Project?

You may be eligible to participate if:

- You are a Kootenai Electric Cooperative member.
- You have a centrally controlled all-electric heating system.
- You have an electric hot water heater.
- You live in the area shown in this [map](#). If you don't live in this area but are interested in participating we would like to put your name on a list for the future - please fill out the form below.

If you pre-qualify for the program, you will be asked to provide additional information. If you are selected to participate, a KEC representative will schedule a time to come to your home to install a programmable thermostat and a water heater monitor. You'll also receive a free home energy audit during that initial visit to learn more about how you can save money on your electric bills. We'll explain what will happen in your home at times of peak electricity demand (only a few times each year), and how you are helping your cooperative to assure there's enough affordable electricity for all of us in the future. Please fill out the form below and click submit when complete.

**Name:**   
(as it appears on your electric bill)

**Address:**

**Account Number:**

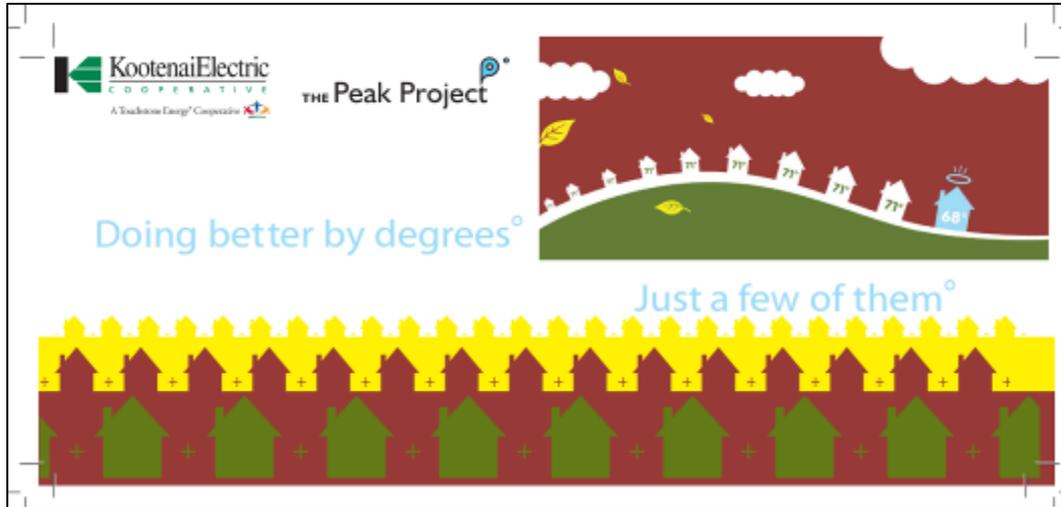
**Email Address:**

**Telephone Number:**

**How did you hear about the Peak Project?** Postcard

**Comments:**

# Bill Insert



Here's how it works:

- 

1 On some days of peak power usage by Kootenai Electric members...
- 

2 We turn off your water heater for just a few hours, and adjust your thermostat by a few degrees. You probably won't even notice.
- 

3 Multiplied across hundreds of homes, this reduces stress on the electrical system and helps ensure a reliable power grid.

**It's this simple. We'd like you to sign up.**

The Peak Project is a program that reduces energy consumption at times of peak demand. By participating, you help slow the demand for power on our system, and could save money on your energy bill. It's a small sacrifice in each home, but if enough members sign up for Kootenai Electric Cooperative's Peak Project, it will make a huge difference in our electrical demand. You may be eligible to participate if:

- You live south of the Spokane River in Coeur d'Alene and Post Falls. Or north of the Spokane River and south of Poleline Ave. in Post Falls.
- You have a centrally controlled all-electric heating system.
- You have an electric hot water heater.

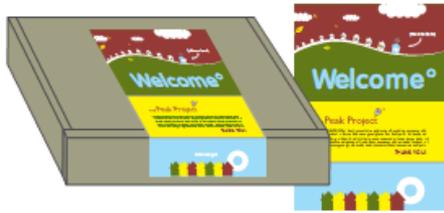
Sign up by calling 208.765.1200 or visit [www.kec.com/peak\\_project.php](http://www.kec.com/peak_project.php)

# Welcome Kit



## Welcome Kit

Package



Welcome package  
Stock kraft 10 8-in corrugated  
Oversized sticker with welcome letter



Liner poster  
For window display



Degree sign static



# It's a Company Effort

- Departments heavily involved
  - Marketing
  - Engineering
  - IT/GIS
  - Member Services

# Contact

## For more information, contact:

Melissa Newcomer

Marketing and Business Development Representative

[mnewcomer@kec.com](mailto:mnewcomer@kec.com)

208.292.3289

Shawn Dolan

Engineering Manager

[sdolan@kec.com](mailto:sdolan@kec.com)

208.292.3276

Keith Brooks

IT Supervisor

[kbrooks@kec.com](mailto:kbrooks@kec.com)

208.292.3255